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EXAMINER

SWERDLOW, DANIEL

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 05/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/796,199	Applicant(s) HUGHES ET AL.	
	Examiner Daniel Swerdlow	Art Unit 2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2006 and 28 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 10-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 10-19 is/are rejected.
- 7) ☒ Claim(s) 5 and 17 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2 February 2006 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 1 through 8 and 10 through 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 refers to a first pair of drivers and an innermost pair of drivers. It is clear from the disclosure that these terms refer to the same pair of drivers. As such the claim should be amended to avoid the ambiguity of using different terms to refer to the same structural elements. In this case, greatest clarity is achieved by replacing "first pair of drivers" with --innermost pair of drivers--.

5. Claim 1 contains the recitation "wherein the first frequency band and the second frequency band comprise a common frequency band at a common level of attenuation". The first frequency band and the second frequency band are components of the signals received by the

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respective pairs of drivers, not structural elements of the invention. Further, because the signals to the different pairs of drivers *comprise* the first frequency and the second frequency band, respectively, the claim language does not exclude the two signals being identical. In addition, since the frequency bands are characteristics of the signals, the limitation “at a common level of attenuation” is indefinite since characteristics of the received signals are limiting on the structure of the invention and it is unclear what is meant by a “level of attenuation” in a received signal.

6. Claims 8 and 14 are indefinite for similar reasons.

7. The remaining claims incorporate the indefinite language due to dependence.

8. In addition, Claim 8 recites the limitation " d_2 is 9.6 inches". There is no occurrence of a recitation of " d_2 " prior to this recitation.

9. In addition, Claim 12 recites the limitation "the at least a third pair of transducers". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. **Claims 1 through 3, 6, 14, 15 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Oyaba et al. (US Patent 4,991,687).**

12. Regarding Claim 1, Oyaba discloses a loudspeaker system having a line array of drivers (Fig. 1) comprising: an innermost (i.e., first) pair of drivers (H_l , H_r) to which signals are supplied

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(i.e., configured to receive a signal from a sound source) (column 2, lines 59-60); a center point (intersection of center axis that includes P_0 ; see column 1, lines 20-21) about which the innermost pair of drivers is substantially centered with a distance d_2 that corresponds to the distance d_0 claimed between them and the drivers receiving a high pass filter output that corresponds to the signal comprising a first frequency band claimed; a second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed, is arranged in the line array with the innermost pair of drivers and substantially centered about the center point with a center-to-center distance of d_1 that corresponds to the distance $4nd_0$ claimed where $n=1$ and, therefore, $d_1=4d_2$ (column 2, line 58), and to which signals are supplied through a low pass filter (receive a signal comprising a second frequency band) (column 2, lines 45-48), wherein the low pass filter and the high pass filter pass frequencies at and about a frequency f_c that corresponds to the common frequency band claimed and equally attenuate those frequencies by a factor of 6dB (column 2, lines 48-63).

13. Regarding Claim 2, Oyaba further discloses a low pass filter on the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed (i.e. $n>0$) (column 2, lines 45-48).

14. Regarding Claim 3, Oyaba further discloses a second set of low frequency drivers (i.e., $n=2>1$) spaced at four times the distance of the first set of low frequency drivers (L_1 , L_r) (column 4, lines 48-56) with a division (i.e., corner) frequency of f_c such that the distance $4d_1$ between the pair of drivers is equal to a wavelength λ_c corresponding to the division (i.e., corner) frequency f_c (column 2, lines 53-55). As such for $n=2$, $c=f_n d_n$ or $f_2=c/4d_1$, and the pair has a different corner frequency, as claimed.

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15. Regarding Claim 6, Oyaba further discloses the low pass filter on the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed (i.e. $n=1$) (column 2, lines 45-48) having a division (i.e., corner) frequency f_c such that the distance d_1 between the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed is equal to a wavelength λ_c corresponding to the division (i.e., corner) frequency f_c (column 2, lines 53-55). As such for $n=1$, $c=f_n d_n$ or $f_n=c/d_n$, as claimed.

16. Regarding Claim 14, in addition to the elements cited above apropos of Claim 1, Oyaba further discloses a distance d_1 between the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed of $\lambda_c \pm 50\%$ (column 5, line 40). This teaches a range of d_1 from $\lambda_c/2$ to $3\lambda_c/2$. Oyaba further discloses a distance d_2 between an innermost (i.e., first) pair of drivers (H_l , H_r) that corresponds to the distance d_0 claimed in a range from $d_1/4$ to $d_1/2$ (column 5, line 40). Substituting, this teaches a range of distance d_2 that corresponds to the distance d_0 claimed in a range from $\lambda_c/8$ to $3\lambda_c/4$. Because $\lambda_c=c/f$, this corresponds to a range for d_0 between $c/8f$ and $3c/4f$, a range that includes $c/2f$ as claimed.

17. Regarding Claim 15, Oyaba further discloses a low pass filter on the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed (i.e. $n>0$) (column 2, lines 45-48).

18. Regarding Claim 19, Oyaba further discloses a directivity pattern without side lobes (Fig. 4).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. **Claims 4, 8, 12, 13, 16 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben (US Patent 5,359,664).**

21. Regarding Claim 4, as shown above apropos of Claim 2, Oyaba anticipates all elements except the low pass filters being of first order. Steuben discloses use of first order low pass filter to provide specific frequency components to loudspeakers (Fig. 4; column 5, line 66-column 6, line 2). One skilled in the art would have known that such an arrangement provides a filtering function with a minimum of components, saving space and cost. It would have been obvious to one skilled in the art at the time of the invention to apply first order filters as taught by Steuben to the system taught by Oyaba for the purpose of realizing the aforesaid advantages.

22. Claim 8 is essentially similar to Claim 4 including the limitations of Claims 1 and 2, and is rejected on the same grounds.

23. Regarding Claim 12, Oyaba further discloses a second set of low frequency drivers (i.e., a third set of transducers that are low pass filtered) (column 4, lines 48-56).

24. Regarding Claim 13, as is shown below apropos of Claim 18, Oyaba discloses an inverse relationship between low pass filter frequency and separation distance, $f_n = c/d_n$. As such, Oyaba teaches the outermost transducers having the lowest frequency filter, as claimed.

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25. Regarding Claim 16, as shown above apropos of Claim 15, Oyaba anticipates all elements except the low pass filters being of first order. Steuben discloses use of first order low pass filter to provide specific frequency components to loudspeakers (Fig. 4; column 5, line 66-column 6, line 2). One skilled in the art would have known that such an arrangement provides a filtering function with a minimum of components, saving space and cost. It would have been obvious to one skilled in the art at the time of the invention to apply first order filters as taught by Steuben to the system taught by Oyaba for the purpose of realizing the aforesaid advantages.

26. Regarding Claim 18, Oyaba further discloses the low pass filter on the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed (i.e. $n=1$) (column 2, lines 45-48) having a division (i.e., corner) frequency f_c such that the distance d_1 between the second pair of drivers (L_1 , L_r) that corresponds to the subsequent pair of drivers claimed is equal to a wavelength λ_c corresponding to the division (i.e., corner) frequency f_c (column 2, lines 53-55). As such for $n=1$, $c=f_n d_n$ or $f_n=c/d_n$, as claimed.

27. **Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of De Vries (US Patent 6,128,395).**

28. Regarding Claim 7, as shown above apropos of Claim 1, Oyaba anticipates all elements except the centered driver. De Vries discloses a directional loudspeaker array with a center driver (Fig. 2b, reference SP0; column 4, lines 20-29). De Vries discloses that such an arrangement provides superior side lobe level suppression. It would have been obvious to one skilled in the art at the time of the invention to apply the centered driver as taught by De Vries to the system taught by Oyaba for the purpose of realizing the aforesaid advantage.

29. **Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben and further in view of Combest (US Patent 5,568,560).**

30. Regarding Claim 10, as shown above apropos of Claim 8, the combination of Oyaba and Steuben makes obvious all elements except the spacing $d_0=1.2$ inches and $d_1=4.8$ inches. As shown above apropos of Claim 14, Oyaba further teaches a range of distance d_2 that corresponds to the distance d_0 claimed in a range from $\lambda_c/8$ to $3\lambda_c/4$. Because $\lambda_c=c/f$, this corresponds to a range for d_0 between $c/8f_c$ and $3c/4f_c$. As such, a distance d_0 of 1.2 inches (i.e., 0.03 meters) corresponds to a crossover frequency in the range between 1400 and 8250 Hz. However, Oyaba is silent as to selecting a crossover frequency, saying only "the frequency range to be reproduced is divided at an arbitrary frequency or division frequency into a higher frequency range and a lower frequency range, each of which being reproduced through a corresponding pair of speakers" (column 1, lines 63-68). Combest discloses a loudspeaker system with a crossover frequency of 2100 Hz (column 6, lines 28-29). Combest further discloses that such an arrangement reduces interference and distortion. It would have been obvious to one skilled in the art at the time of the invention to apply the crossover frequency taught by Combest to the combination made obvious by Oyaba and Steuben for the purpose of realizing the aforesaid advantages.

31. **Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oyaba in view of Steuben and further in view of De Vries.**

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32. Regarding Claim 11, as shown above apropos of Claim 8, the combination of Oyaba and Steuben makes obvious all elements except the centered driver. De Vries discloses a directional loudspeaker array with a center driver (Fig. 2b, reference SP0; column 4, lines 20-29). De Vries discloses that such an arrangement provides superior side lobe level suppression. It would have been obvious to one skilled in the art at the time of the invention to apply the centered driver as taught by De Vries to the combination made obvious by Oyaba and Steuben for the purpose of realizing the aforesaid advantage.

Allowable Subject Matter

33. **Claims 5 and 17 are objected to as being dependent upon a rejected base claim**, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and if indefiniteness described above under *Claim Rejections-35 USC § 112* were resolved.

34. Regarding Claim 5, as shown above apropos of Claim 6, Oyaba discloses a corner frequency $f_n = c/d_n$. Further, because Oyaba teaches a range of values for d of $\pm 50\%$, Oyaba discloses a corner frequency up to $1.5c/d_n$. However, Oyaba does not disclose or suggest a corner frequency of $2c/d_n$ as claimed. As such, Claim 5 is allowable matter.

35. Claim 17 contains limitations similar to Claim 5 and is allowable matter for the same reasons.

Response to Arguments

36. Applicant's arguments filed 2 February 2006 have been fully considered but they are not persuasive. Applicant alleges that Oyaba fails to disclose the two frequency bands comprising a common frequency band at a common level of attenuation as claimed in Claims 1 and 14.

Examiner respectfully disagrees. As shown in the prior art rejection above, Oyaba discloses one set of drivers receiving a high pass filter output that corresponds to the signal comprising a first frequency band claimed and the other set of drivers receiving a low pass filter output, with the low pass filter and the high pass filter pass frequencies at and about a frequency f_c that corresponds to the common frequency band claimed and equally attenuate those frequencies by a factor of 6dB. Further, the prior art rejection goes beyond what is claimed since the claims only state that the first frequency band and the second frequency band are components of the signals received by the respective pairs of drivers, not structural elements of the invention. Further, because the signals to the different pairs of drivers *comprise* the first frequency and the second frequency band, respectively, the claim language does not exclude the two signals being identical. In addition, since the frequency bands are characteristics of the signals, the limitation "at a common level of attenuation" is indefinite since characteristics of the received signals are limiting on the structure of the invention and it is unclear what is meant by a "level of attenuation" in a received signal.

37. Applicant's remaining arguments are limited to similarities with or dependence from Claims 1 and/or 14 and are unpersuasive for the same reasons.

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Conclusion

Examination of this application has been transferred to the undersigned. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Daniel Swerdlow
Primary Examiner
Art Unit 2615

ds
16 May 2006